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54 Rotary pump for semisolid products particularly for filling sausages with minced meat.

57 The rotary pump for semisolid products particularly for filling sausages with minced meat comprises a stator defined by a cavity 2 perimetally provided with an opening 3 for the delivery of the semisolid product, a rotor 4 accommodated substantially in the abovesaid cavity and having a lower part 5 having a diameter substantially equal to the diameter of the cavity and a central raised portion 6 having a diameter substantially smaller than said cavity to define an annular chamber 7 provided with a dividing partition 9 and having pumping elements 8 rotatably associated with the lower part of the rotor 4 and carried rigidly equidistant thereby along the annular chamber so as to move the product towards said delivery opening, there being furthermore provided a lid 10 for the closure of the annular cavity having an opening 11 for the filling thereof with the product.

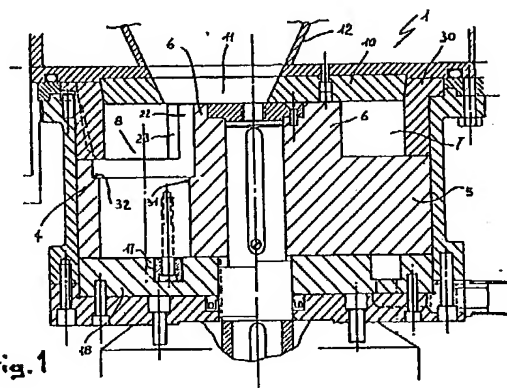


Fig. 1

## Description

## ROTARY PUMP FOR SEMISOLID PRODUCTS PARTICULARLY FOR FILLING SAUSAGES WITH MINCED MEAT

The present invention relates to a rotary pump for semisolid products particularly for filling sausages with minced meat.

As is known, current sausage-making machines essentially comprises a hopper for loading the product to be made into sausages adapted to feed, in a vacuum, a sausage-filling pump also operating in a vacuum.

One of the main problems which sausage-filling pumps must solve relates to the so-called "mushing" of the product during its pumping.

Considering that a sausage must have a compact appearance with a regular and uniform distribution of the fat and that it furthermore must have a porosity which ensures its perfect drying during seasoning, it is easily understandable that any excess of "mushing" during the sausage-making of the product may compromise one or more of the abovesaid characteristics, causing the decrease of the quality of the sausage.

To obviate at least partially the disadvantage of "mushing", sausage-filling pumps have been produced having product pumping elements such as for example double mutually interacting scrolls, eccentric gears, single-piston or twin reciprocating-piston pumps and also pumps with radially or axially retracting blades.

Despite the numerous technical solutions adopted, the disadvantage deriving from mushing, though it has been reduced, has not been yet completely solved; indeed in some pumps, since due to possible plays of the pumping elements the product passes beyond the active pumping region to pass into a passive adjacent or underlying region, said product is reintroduced with various devices into the pump to be made into sausages, with a qualitative decrease of the produced sausages.

Besides the above, for hygienic reasons the pumps must be furthermore manufactured with resistant and stainless materials and must be easy to disassemble for their complete periodic checking and washing.

The aim proposed by the present invention is to eliminate the above described disadvantages by providing a rotary pump for semisolid products particularly for making sausages with minced meat which allows the making of a product into sausages without substantially generating, during said operation, the partial or total mushing thereof.

Within this aim an object of the present invention is to provide a rotary pump for semisolid products particularly for filling sausages with minced meat which features extreme ease in the assembly and disassembly of its components so as to be easily periodically checked and cleaned.

Still another object of the present invention is to provide a rotary pump for semisolid products particularly for filling sausages with minced meat which has a constant flow-rate regardless of the law of motion of said pumping elements.

Not least object of the invention is to provide a

rotary pump for semisolid products particularly for making sausages with minced meat the pumping elements whereof are subject to uniform wear so as to have a longer life without the formation of any plays suitable to determine a possible "mushing" of the product during sausage-making.

This aim, as well as these and other objects, are achieved by a rotary pump for semisolid products particularly for filling sausages with minced meat comprising: a stator defined by a cavity perimetally provided with an opening for the delivery of the semisolid product, a rotor accommodated coaxially in said cavity and provided with a lower part having a diameter substantially equal to the diameter of said cavity and a central raised portion having a diameter substantially smaller than said lower part to define an annular chamber provided with a dividing partition and having elements for the pumping of said product towards said delivery opening, a lid for closure of said cavity having an opening for the filling thereof with said product, characterized in that said pumping elements are rotatably associated with said lower part of said rotor and carried rigidly equally spaced thereby along said annular chamber.

Further characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of the rotary pump for semisolid products particularly for filling sausages with minced meat according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a sectional lateral elevation view of the pump according to the invention;

figure 2 is a schematic plan view of the pump illustrated in figure 1 according to the invention;

figure 3 is a plan view of the guiding cam of the pumping elements according to the invention; and

figure 4 is a schematic perspective view of the passage of one of the pumping elements behind the dividing partition after moving the product to be made into sausages towards the delivery opening.

With particular reference to the above described figures, the rotary pump according to the invention is generally indicated by the reference numeral 1, and comprises: a stator defined by a cavity 2 which is conveniently perimetally provided with an opening for the delivery of the semisolid product, indicated at 3.

The stator has, accommodated in its interior coaxially to the cavity 2, a rotor 4 which has a lower part 5 having a diameter substantially equal to the diameter of the cavity 2 and a central raised portion 6 having a diameter substantially smaller than the lower part 5 so as to define an annular chamber 7 provided with pumping elements, generally indicated by 8, for pumping the product towards the delivery opening 3.

Internally to the annular pumping chamber 7 there is furthermore provided a dividing wall 9 adapted to

convey the product towards sausage-making and upwardly with respect to the stator and to the rotor there is provided a closure lid 10 having an opening 11 adapted to allow the passage, in a vacuum, of the product to be made into sausages from a hopper 12 to the annular chamber 7 of the pump.

The pumping elements 8 are advantageously rotatably associated with the lower part 5 of the rotor and carried rigidly equally spaced thereby along the entire extension of the annular chamber 7.

More in detail, the pumping elements 8 are rotatable about their own axes which are substantially parallel to the axis of the rotor 4.

The pumping elements 8 are accommodated in respective circular seats 13, defined on the lower part 5 of the rotor, and are furthermore partially accommodated in semicircular cavities 14 defined on the raised central portion 6 of said rotor. The circular seats 13 are arranged, with respect to the axis of rotation of the rotor, radially and mutually equidistant in the annular chamber 7.

Each pumping element 8 has a cylindrical lower region 15 and an upper region having a cross section defined by two arcs of a circle in a cliptical-like shape 16, on the opposite side whereof, from the cylindrical lower region 15, there extends at least one pin 17 having an axis substantially parallel to the axis of the pumping elements.

The pin 17 is arranged eccentrically with respect to the base of each of the pumping elements 8 and engages with a control cam 18 accommodated coaxially below the rotor 4.

The cam 18 has at least one radial groove 19 having a first portion  $\delta$  20 opposite to a second portion  $\beta$  21, both having a substantially circular shape.

Conveniently, the first portion 20 is spaced further from the axis of the cam with respect to the second portion which on the contrary is much more proximate thereto.

The first and the second portion 20 and 21 may be connected to one another by means of a groove 19 having any shape but adapted to engage the pin 17 so as to impart to each pumping element 8 a half rotation about its own axis to move the upper region with cliptical-shaped cross section 16 from a work position adapted to occupy the entire annular chamber 7 to a rest position adapted to fully occupy the semicircular cavities 14.

More in detail, the upper regions 16 of the pumping elements have the curvature of the outer surface 22 equal to the inner curvature of the circular seats 13 while the curvature of the surface 23 of the upper region 16, counterposed to the surface 22, is substantially equal to the curvature of the perimetral surface of the raised region 6 of the rotor.

In this manner when the upper region with cliptical-shaped cross section 16 is accommodated in the semicircular cavity 14 the rotor assumes a perfectly cylindrical configuration and the annular chamber 7 is free from the pumping elements.

During the rotation through substantially 90 degrees of the pumping elements, the upper region 16 thereof, by virtue of the interference of the pin 17 in the cam 18, moves with a law given by the profile

of the cams in a radial direction in the annular chamber creating a partition thereof in as many separate chambers as there are pumping elements.

The chambers thus defined rotate together with the rotor, moving the material to be pumped towards the delivery opening 3 also by virtue of the presence of the dividing partition 9.

Before the latter, the pumping elements are made to rotate again in reverse direction so as to be perfectly comprised within the dimensions of the raised portion 16 of the rotor so as to pass within the fixed dividing partition 9 which interrupts the annular chamber immediately after the delivery outlet.

Internally to the annular chamber 7 there is furthermore present an extractable annular element 30 removably and concentrically accommodated therein and adapted to prevent the exit of the pumping elements 8 from their seats 13 and to furthermore delimit the width of the annular chamber 7 so that the latter is substantially equal to the length of the upper cliptical-shaped region 16 of the pumping elements.

It should be furthermore specified that the lower cylindrical region 15 has an annular abutment 31 engaging with a counter-abutment 32 provided in each of said circular seats 13 so as to allow the slideable support of the pumping elements and allow their friction to be uniformly distributed on a circumference so as to have an extremely reduced wear thereof.

Merely by way of example, it is furthermore specified that the cylindrical region 15 has its upper face 33 co-planar with the bottom of the annular chamber 7 and that the upper face of the upper cigar-shaped region 16 is co-planar with the upper surface of the rotor.

The operation of the rotary pump for semisolid products particularly for filling sausages with minced meat according to the invention is evident from what is described and illustrated; in particular with reference to the described figures it can be observed that the engagement of the pin 17 within the recess 20 of the cam 18, by virtue of the particular configuration thereof, determines a rotation through approximately 90° of each pumping element, moving it, immediately after the dividing partition 9, in a radial position so as to be able to take the product arriving from the hopper through the filling opening present on the closure lid of the rotary pump and carry it to the delivery opening 3.

By virtue of the presence of the extractable annular element 30, the pumping elements remain retained in the respective seats and, at the same time, may freely rotate about their own axis on the annular abutment 31 so as to reduce friction and therefore the wear thereof.

In this manner it is easily understandable that in practice the "mushing" of the product, during its pumping for sausage-making, is minimized if not indeed almost nil and at the same the wear of the pumping elements is extremely reduced, allowing a longer life thereof and therefore, and for a rather long period of time, an absence of plays of the various components of the pump.

The invention thus conceived is susceptible to

numerous modifications and variations, all of which are within the scope of the inventive concept; moreover, all the details may be replaced with technically equivalent elements.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements and to the state of the art.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

## Claims

1. Rotary pump for semisolid products particularly for making sausages with minced meat, comprising: a stator defined by a cavity (2) perimetally provided with an opening (3) for the delivery of the semisolid product, a rotor (4) accommodated coaxially in said cavity and having a lower part (5) having a diameter substantially equal to the diameter of said cavity and a central raised portion (6) having a diameter substantially smaller than said lower part, to define an annular chamber (7) provided with a dividing partition (9) and having elements (8) for the pumping of said product towards said delivery opening, a lid (10) for closure of said cavity having an opening (11) for the filling thereof with said product, characterized in that said pumping elements (8) are rotatably associated with said lower part (5) of said rotor (4) and carried rigidly equally spaced thereby along said annular chamber (7).

2. Rotary pump according to claim 1, characterized in that said pumping elements are rotatable about their own axes substantially parallel to the axis of rotation of said rotor (4).

3. Rotary pump according to claims 1 and 2, characterized in that said pumping elements are accommodated in respective circular seats (13) defined on said lower part and partially in said raised central part.

4. Rotary pump according to one or more of the preceding claims, characterized in that said circular seats are arranged radially in said cavity and equidistant from the axis of rotation of said rotor.

5. Rotary pump according to one or more of the preceding claims, characterized in that said circular seats perimetally define semicircular cavities (14) on said raised central part.

6. Rotary pump according to one or more of the preceding claims, characterized in that said pumping elements have a lower cylindrical region (15) and an upper region having a substantially cliptical-shaped cross section (16), from said cylindrical lower surface there extending at least one pin (17) in a direction

substantially parallel to the axis of said pumping elements.

7. Rotary pump according to one or more of the preceding claims, characterized in that said pin is arranged eccentrically with respect to the base of each of said pumping elements and engages with a control cam (18) accommodated coaxially below said rotor.

8. Rotary pump according to one or more of the preceding claims, characterized in that said upper regions have the curvature of the outer surface (22) equal to the inner curvature of said circular seats and the curvature of the counterposed surface (23) substantially equal to the curvature of the outer surface of said rotor.

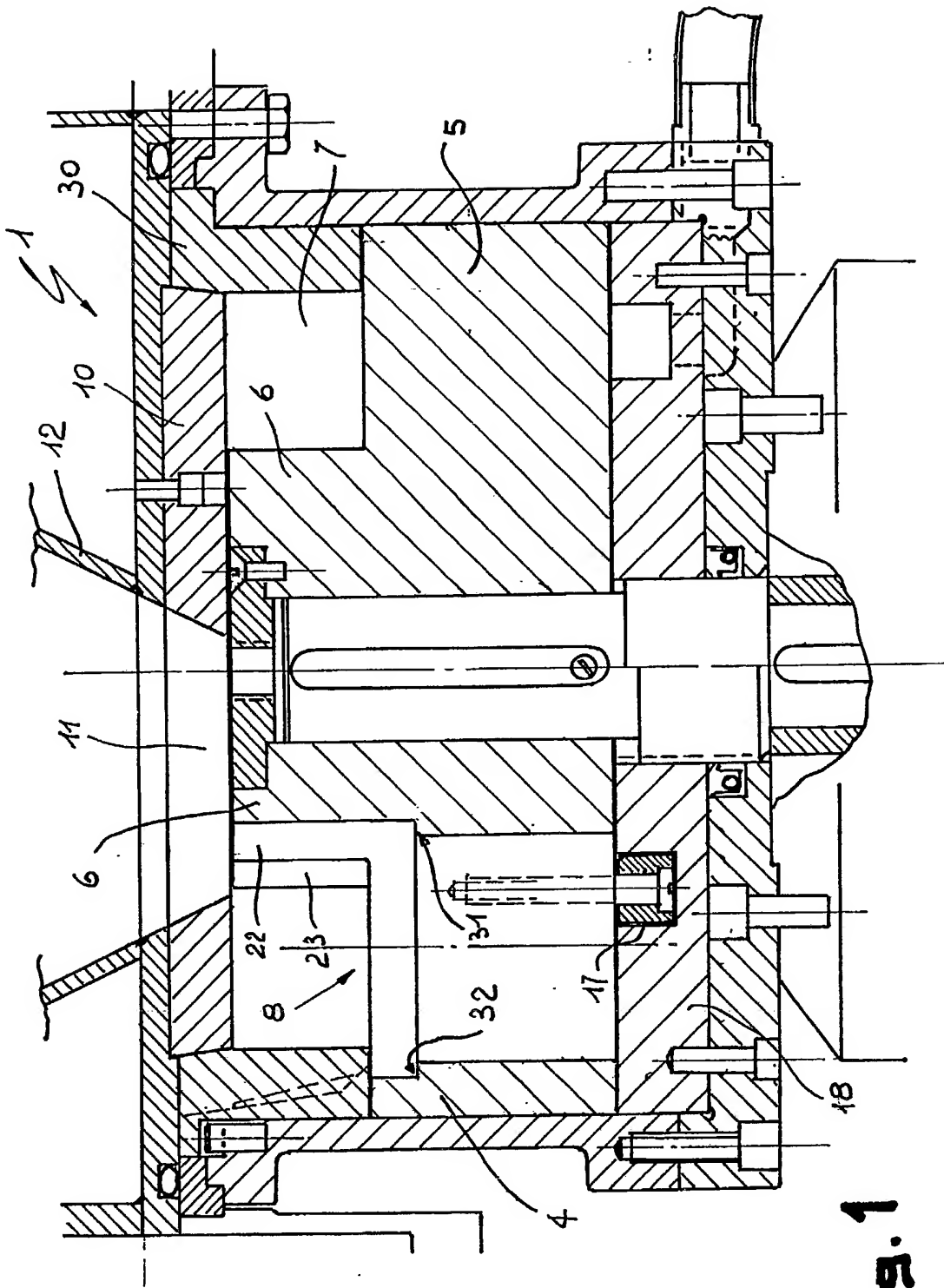
9. Rotary pump according to one or more of the preceding claims, characterized in that it comprises an extractable annular element (30) removably concentrically accommodated in said cavity and adapted to prevent the exit of said pumping elements from said seats and to delimit the width of said annular chamber which is substantially equal to the length of the upper cliptical-shaped region of said pumping elements.

10. Rotary pump according to one or more of the preceding claims, characterized in that said cam has at least one radial groove (19) having a first portion (20) diametrically opposite to a second portion (21), both substantially circular, said first and said second portion having different distance from the axis of said rotor.

11. Rotary pump according to one or more of the preceding claims, characterized in that said lower cylindrical region (15) has an annular abutment (31) engaging with a counter-abutment (32) provided in each of said circular seats (13) for the slideable support of said pumping elements.

12. Rotary pump according to one or more of the preceding claims, characterized in that the upper face (33) of said lower cylindrical region is co-planar with respect to said bottom of said annular chamber (7) and in that the upper face of said upper region with cliptical-shaped configuration is co-planar with respect to the upper surface of said rotor.

13. Rotary pump for semisolid products particularly for filling sausages with minced meat, characterized in that it comprises one or more of the described and/or illustrated characteristics.



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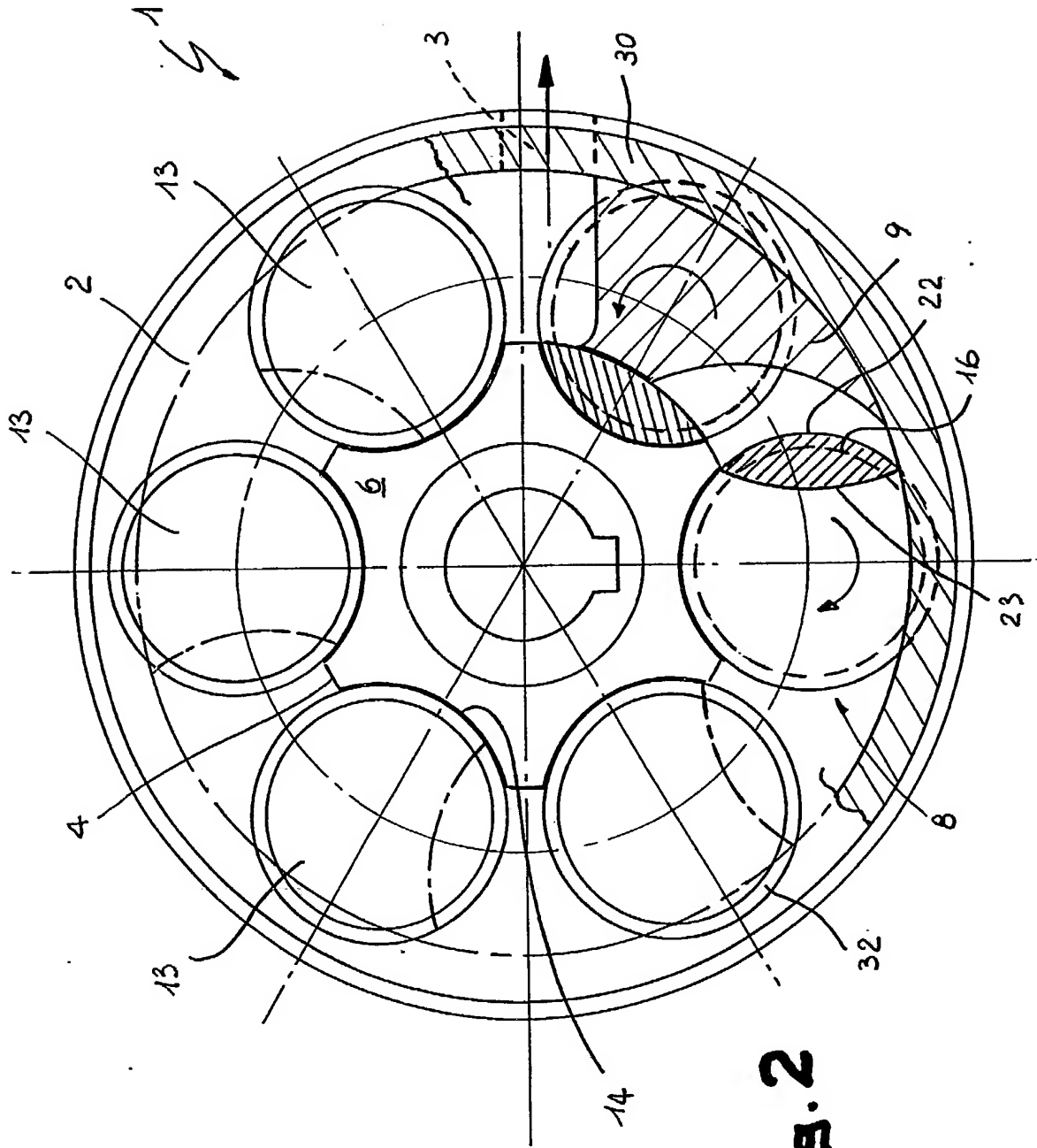


Fig. 2

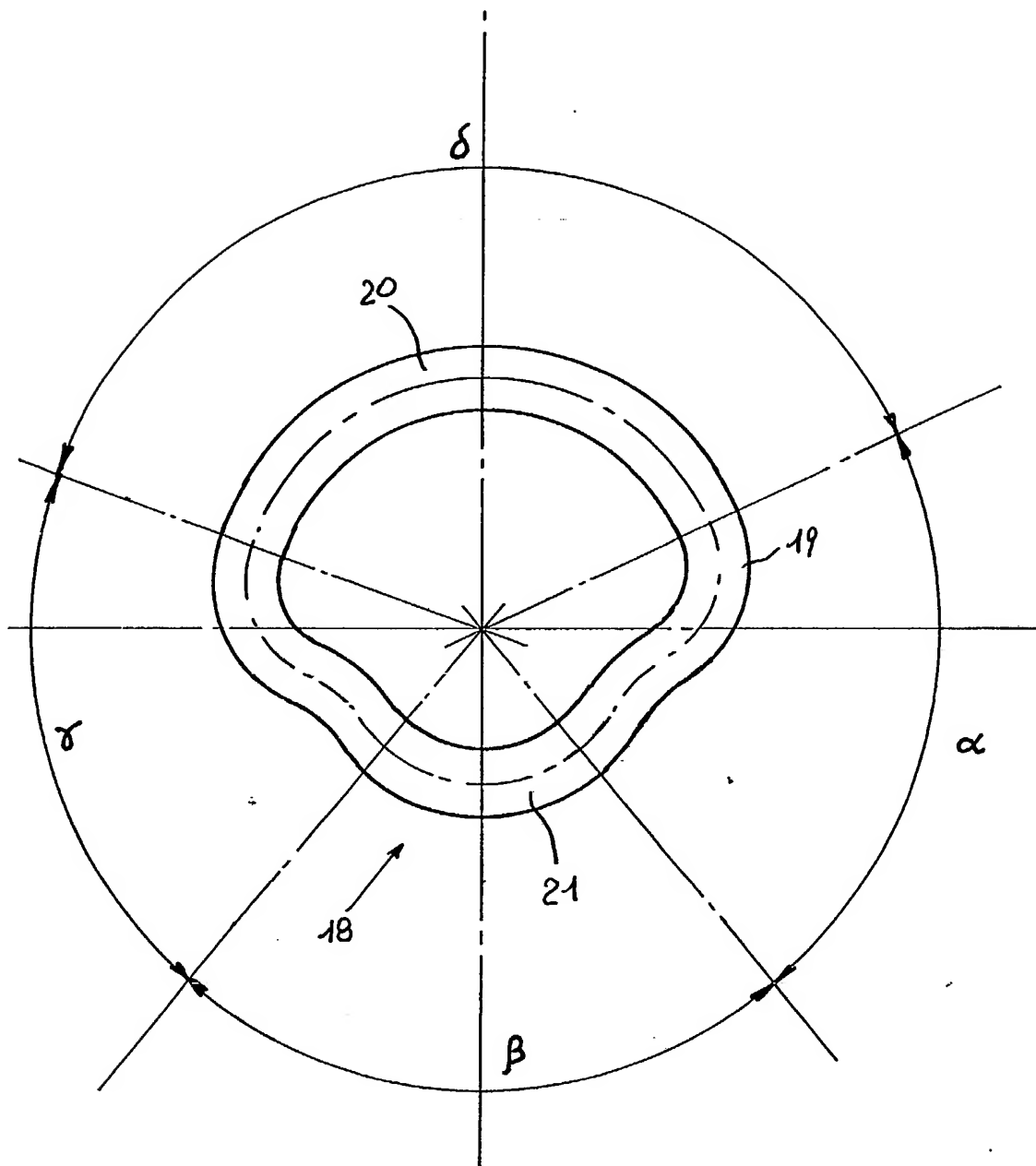
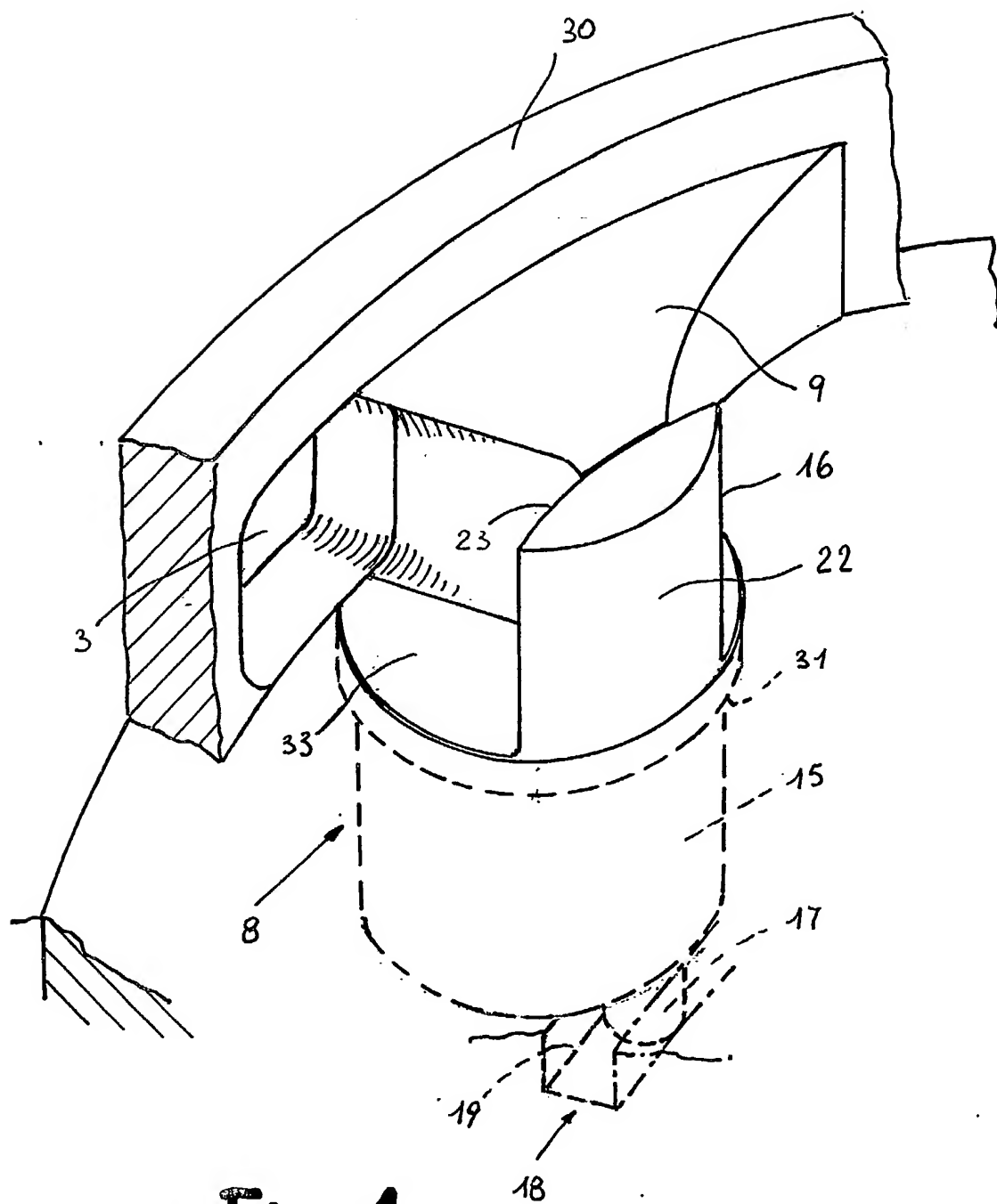


Fig.3



**Fig. 4**



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ABSTRACT:

The rotary pump for semisolid products particularly for filling sausages with minced meat comprises a stator defined by a cavity 2 perimetrally provided with an opening 3 for the delivery of the semisolid product, a rotor 4 accommodated substantially in the abovesaid cavity and having a lower part 5 having a diameter substantially equal to the diameter of the cavity and a central raised portion 6 having a diameter substantially smaller than said cavity to define an annular chamber 7 provided with a dividing partition 9 and having pumping elements 8 rotatably associated with the lower part of the rotor 4 and carried rigidly equidistant thereby along the annular chamber so as to move the product towards said delivery opening, there being furthermore provided a lid 10 for the closure of the annular cavity having an opening 11 for the filling thereof with the product.